Do non-formal and informal adult education affect citizens' political participation during adulthood?

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Keywords: Political participation, political action, non-formal and informal adult education

- Non-formal and informal adult education have an impact on adults' political participation.
- The results differ with regard to the intention to participate and reported participation.
- Voluntary courses significantly influenced adults' intention to participate politically.
- Mandatory courses did not affect adults' political participation.
- Reading books or magazines significantly affected adult voter turnout.

Purpose: While research on political participation hardly takes into account the effects of non-formal or informal education, the effects of formal education are well investigated. The aim of this paper is to determine the extent to which non-formal and informal education contribute to adults' participation in different political activities when formal educational background and other socioeconomic factors are controlled.
Method: This paper uses data from the German National Educational Panel Study (NEPS, N=9,084). Binomial logistic regressions are used for the analyses, and average marginal effects (AMEs) are used for the model's output.
Findings: The findings reveal that non-formal and informal adult education significantly affect different political activities. However, the effects of non-formal and informal adult education differ with regard to the different forms of political participation. The results underline the importance of differentiated analyses of political participation and non-formal and informal adult education. In addition, the results show that some types of non-formal and informal education have a greater impact on adults of low socioeconomic status.
Research limitations: This paper cannot account for self-selection effects because adults' participation in different political activities was collected only in one wave.

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1 Introduction

Studies on the effect of education on political participation have a long tradition in political science and educational research. Particularly in democracies, the impact of

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formal education, in the form of graduation certificates, on various modes of political participation has been examined (Bödeker, 2012; Campbell, Converse, Miller, & Stokes, 1960; Gille, de Rijke, & Gaiser, 2011; Hadjar & Becker, 2006, 2007; Mays, 2008; Rosenstone & Hansen, 1993; Schlozman, Verba, & Brady, 2012; Verba, Schlozman, & Brady, 1995; Wolfinger & Rosentone, 1980). One of the key research findings in political science is that people with a higher educational level are more involved in politics, participate more intensively and exercise their democratic rights better and more comprehensively than do individuals with lower-level school degrees. The influence of education, however, differs depending on the concrete form of political participation (Campbell, 2009; Steinbrecher, 2009). Moreover, the effects of education on political participation differ with regard to institutional arrangements and contextual features, which in turn vary across countries. Based on the data of the European Social Survey, Gallego (2010, p. 239) shows, for example, that in some European democracies no strong systematic relationship between education and voting in elections was found, whereas a strong relationship between education and unequal voter turnout in countries such as the Czech Republic and Germany has been observed.

In regard to explaining the effects of education on political participation, one starting point is to recall Paulo Freire's influence on educational models, educational training of teachers and adult learning (Gadotti & Torres, 2009, pp. 1264-1266). His contributions to the theoretical model of Critical Pedagogy have afforded young people "to acquire and assert a sense of their rights and responsibilities in a democratic society that recognizes the common good over the corporate good" (Giroux, 2010, p. 335). According to Freire, education is a "political and moral practice that provides the knowledge, skills and social relations which enable students to explore for themselves the possibilities of what it means to be engaged citizens" (Giroux, 2010, p. 336). Freire's ideas and pedagogical approach have exerted a lasting influence over generations of teachers and intellectuals in several advanced industrial societies (Gadotti & Torres, 2009, p. 1265; Giroux, 2010, p. 335).

Research on how educational experiences affect the political engagement of citizens has proceeded along three different tracks (Persson, 2013b). A substantial body of research has examined the impact of education on civic and political knowledge (some refer to this as the 'education as a cause view' or as the 'absolute education model'; see Persson, 2013b, p. 690). There is evidence that education increases political knowledge and skills relevant to understanding and participating in politics (Campbell, 2006, pp. 83-96, 2008; Grönlund & Milner, 2006, pp. 390-396; Hillygus, 2005, p. 41; Nie & Hillygus, 2001, pp. 44-47; Niemi & Junn, 1998, p. 121; Oberle & Leunig, 2018; 225-234; Torney-Purta, Lehmann, Oswald, & Schulz, 2001, pp. 157-161; Verba et al., 1995, p. 305). Political knowledge, in turn, is a strong predictor of political participation (Braun & Tausendpfund, 2019; p. 221; Delli Carpini & Keeter, 1996, pp. 226-227; Galston, 2001; Popkin & Dimock, 1996, pp. 140-142). In addition to skills and knowledge, education might also affect internal stimuli to political activity, such as political interest and efficacy, factors that all – in turn – foster participation in politics (Persson, 2013a, p. 13; Verba et al., 1995, pp. 344-349). Research into educational effects has been limited, however, because evidence on the mechanism by which education affects political knowledge or other factors (for example political interest) has been scarce, at least until recently (Dudley & Gitelson, 2002, p. 178; Hillygus, 2005, p. 25). One reason for the missing link is that, methodologically, determining if and how educational experiences affect political knowledge is complex (Campbell, 2006, p. 55; Persson, 2013b, pp. 693-694). In addition, Persson (2013b, p. 691, 2015, p. 587) underlines that many previous studies draw on cross-sectional data that cannot account for self-selection effects. Recent findings begin to provide insights into the relationship between education and political knowledge (Campbell, 2008; Hillygus, 2005; Oberle & Leunig, 2018; Persson, 2015). In contrast, another body of research suggests that the relationship between education and political participation could be explained with reference to self-selection effects. Researchers argue that pre-adult factors affect both educational choice and citizens' engagement

in political activities during adulthood (Persson, 2013b, pp. 691-692). A third body of research offers another revisionist view. According to this view (which is often referred to as 'the sorting model'), the social status gained by relatively higher education supposedly increases citizens' political participation (Campbell, 2009; Persson, 2011, 2013b, pp. 692-693). Persson & Oscarsson (2010, p. 140) emphasize that these three models represent extreme opinions about educational effects. In sum, research points in different directions, and therefore, this is an area in need of further study. However, the models help to explain possible pathways between education and political participation.

Previous studies on the relationship between education and political participation usually include the highest educational attainment as an independent variable in the study design (e.g., Gille et al., 2011; Hadjar & Becker 2006, 2007; Schäfer, Schwander, & Manow, 2016; Schlozman et al., 2012). Thus, the influence of individual educational pathways – and particularly the influence of continuing education – has often been neglected. Particularly in Germany, the effects of education on political participation are large (Gallego, 2010). A look at the configuration of the German education and training system is important to understand the mechanisms guiding returns to education. Germany's education and training system facilitates a large number of different educational chains and trajectories in formal, non-formal, and informal environments (Blossfeld, Roßbach, & von Maurice, 2011; Blossfeld & von Maurice, 2011, p. 19). After completing primary education, students can transfer to three different secondary school types[1]: lower, intermediate and upper-level secondary schools. School leavers of upper-level secondary schools mainly transfer to tertiary education at universities and universities of applied sciences. Only a small share of upper secondary school leavers (approximately 22%) enter vocational education and training (VET) that are full-qualifying or, in other words, that lead to recognized certificates (Authoring Group Educational Reporting, 2018, p. 131). After completing lower or intermediate secondary school, students face different alternatives (Solga, 2014; Tjaden, 2017). One of the dominant pathways is entering a VET program. School leavers with an intermediate school certificate, however, are two times more likely to enter full-qualifying VET programs than those holding lower secondary school degrees (Authoring Group Educational Reporting, 2018, p. 131). Moreover, access to full-qualifying VET programs is important in preventing unemployment and, thus, the risk of social exclusion (Authoring Group Educational Reporting, 2018, pp. 200-201). Based on data from the German Socio-Economic Panel, Groh-Samberg and Lohmann (2011) report that respondents' participation in politics and culture varies strongly according to school-leaving and VET qualifications. The risk of social exclusion in terms of low participation in culture and politics is relatively high among respondents with low school-leaving qualifications and without VET qualifications. For example, individuals with a lower secondary school leaving certificate (Hauptschulabschluss) tend to show less political interest (15%), while those with an intermediate school leaving certificate show a significantly higher interest in politics (appr. 35%; Groh-Samberg & Lohmann, 2011, p. 185).

Although educational trajectories in Germany continue after completing compulsory school, VET, or higher education, existing research on political participation has paid little attention to the effects of adult learning in non-formal or informal environments (Feinstein & Hammond, 2004, p. 104). However, some studies provide evidence that adult education increases participation in political activities (Feinstein & Hammond, 2004; Ruhose, Thomsen, & Weilage, 2019).

Non-formal training courses are the most common type of adult education in Germany (Bilger, Gnahs, Hartmann, & Kuper, 2013, pp. 82-83). Based on internationally comparable data from the Adult Education Survey and the continuing vocational training survey (CVTS), findings underline the importance of non-formal adult education: in Germany, the general participation rates of employed adults in non-formal education as well as in job-related non-formal education are approximately 50% and thus above the EU-28 average (Cedefop, 2015, p. 58, p. 106). Non-formal adult education refers to a wide range of institutionalized courses, mostly short ones that do not lead to recognized certificates (Allmendinger et al., 2011, p. 288). The most important

context of non-formal adult education is the company or workplace: companies mainly provide non-formal training courses (Authoring Group Educational Reporting, 2018, p. 175-176), and thus, adults in Germany participate mostly in job-related, non-formal education activities. The majority of job-related learning activities are fully or partly paid for by employers. A small share of adults participates in job-related learning activities without any support from their employers. In addition to job-related activities, there are also nonjob-related activities, which account for a minority of non-formal adult learning (Cedefop, 2015, p. 59). Little is known about informal adult education, which is defined "as learning resulting from daily life activities related to work, family, or leisure" and is often referred to as non-intentional or experiential learning (Colardyn & Bjornavold, 2004, p. 71). Informal learning is not only important on the job but also in the course of political engagement (Allmendinger et al., 2011, p. 288).

Understanding non-formal and informal adult education as an essential part of educational trajectories leads to the question of to what extent non-formal and informal adult education contribute to participation in political activities when formal educational background and other socioeconomic factors are controlled.

2 Theory: Returns to adult learning – effects of non-formal and informal adult education on political participation

This section discusses the mechanisms by which participation in non-formal and informal adult education may affect adults' political participation. The theoretical framework broadly follows the dominating models in the discussion of how education is related to political participation.

2.1 The cognitive pathway: acquisition of knowledge and skills via non-formal and informal adult education

Developing knowledge and skills that citizens need to understand the political system and to express their ideas is one way in which education supposedly triggers political participation (Brady, Verba, & Schlozman, 1995; Persson, 2013b, p. 690-691; Verba et al., 1995). Galston (2001, p. 223), for example, emphasizes that it is difficult for citizens to understand political events or to integrate new information into an existing framework, unless they possess a basic level of knowledge, especially concerning political institutions and processes. Verbal and cognitive competences that go hand in hand with better education are an essential prerequisite of participating politically. Language and abilities in writing and speaking are necessary to understand and communicate about politics (Persson, 2013, p. 16). In addition to knowledge and skills, education triggers encouraging attitudes such as political efficacy (Verba et al., 1995, p. 349). Citizens with better education are supposedly more likely to believe they can effectively influence decisions in the political process (Jackson, 1995, p. 280).

The acquisition of civic skills (such as the communication and organizational capacities needed for political activity) begins early in life, particularly in school (Brady et al., 1995, p. 273; Verba et al., 1995, pp. 304-305). Although a large part of education during the life course occurs prior to entering the labor market (Ehlert, 2017, p. 437), the development of civic skills does not cease when schooling ends. Citizens can acquire civic skills throughout the life cycle, notably as adults (Brady et al., 1995, p. 273; Verba et al., 1995, pp. 304-305). Non-political institutions offer many opportunities for adults to acquire, maintain, or refine civic skills. Hence, Verba et al. (1995, p. 310) hypothesize that by developing skills in the workplace and other non-political institutions, adults also become more competent in politics.

During adulthood and the course of their working life, individuals in Germany have access to different courses of adult learning and additional learning environments that comprise or foster educational processes (Bäumer et al., 2011, p. 88). Feinstein and Hammond (2004, pp. 201-202)

suggest that adult education fosters generic cognitive and personal development. Beyond formal and non-formal education, adults can acquire knowledge and skills in informal learning environments. Informal learning processes are organized by individuals themselves (Allmendiger et al., 2011, p. 288), and the roles of students and teachers are not clearly defined. This informality characterizes using the Internet, reading specialist magazines or books, asking questions of colleagues, etc. Hence, learning activities in informal environments can also provide opportunities to acquire civic skills. Therefore, learning in non-formal and informal environments may also enable the development of civic skills, which in turn trigger political participation.

2.2 The positional pathway: positional effects of non-formal and informal adult education

The relative education model (or 'sorting model') claims that education affects political participation through sorting processes (Persson, 2011, p. 456, 2013b, p. 692-693). According to the sorting model, "education matters to the extent that it determines an individual's social network position, which in turn influences political participation" (Persson, 2011, p. 458). In other words, education works as a sorting mechanism that places individuals with higher levels of education into environments that encourage political participation (Persson, 2013b, p. 693). In numerous studies, socioeconomic status (SES) has been proven to be a powerful predictor of participation (e.g., Brady et al., 1995).

Non-formal and informal adult education may also advance social class in terms of SES (Feinstein & Hammond, 2004, p. 202). Some scholars have found that adult education leads to increased income levels and job promotions (Büchel & Panneberg, 2004; Ehlert, 2017; Ruhose, Thomsen, & Weilage, 2019; Wolter & Schiener, 2009). These monetary returns to adult education have the potential to affect one's social network position.

Adults who come from a high-status background are already more likely to be politically engaged (Brady et al., 1995), whereas low-SES adults are less likely (Gimpel, Lay, & Schuknecht, 2003). Therefore, non-formal and informal adult education are perhaps more likely to have a larger impact on adults with lower SES. Previous literature has hinted that adult education can compensate for social disadvantages (Minello & Blossfeld, 2017; Campbell, 2008). However, it is also reasonable to expect that non-formal and informal adult education have a higher impact on adults with higher SES than on less-advantaged adults (some refer to this as an "acceleration effect", see Campbell, 2008). One explanation is that people with higher SES (those with higher educational attainment, with jobs, and/or those employed in high-skilled occupations) participate more frequently in adult education than do adults with lower SES (Becker & Hecken, 2018, pp. 400-401; Boyadjieva & Ilieva-Trichkova, 2017). Studies reveal two main mechanisms behind this social inequality in adult education¬: cumulative disadvantages/advantages and the "Matthew effect" (Bask & Bask, 2015).

2.3 Training assignment as a mediator of the relationship between adult education and political participation

Different returns of adult education courses may also be expected, depending on the form, duration, quality and the subject area (content) of the training course. There is, moreover, variation among individuals who participate in non-formal training courses. Returns of non-formal training courses can vary depending on the initial motivation that leads adults to take part in these courses. Because companies in Germany are the main provider of adult learning, employers may require employees to participate in non-formal training courses to enhance knowledge or skills needed for the workplace. Motivation – and particularly interest in the subject of the course – are crucial for learning (Krapp, 2005) and might vary with the training assignment (voluntary vs. mandatory). A number of studies have examined the impact of the training assignment in adult training courses on training motivation and training outcomes. In the past, some studies showed

that mandatory training courses resulted in higher levels of training motivation (Tsai & Tai, 2003). In contrast to these findings, the majority of studies support the positive effects of voluntary training courses. Most recently, based on a meta-analysis of 29 studies, Gegenfurtner, Könings, Kosmajac and Gebhardt (2016) demonstrated that trainees who voluntarily participated in a training program were more motivated and transferred more than trainees for whom training was mandatory. In line with this, Curado, Lopes Henriques, & Ribeiro (2015) reported that voluntary enrollment has a greater impact on the autonomous motivation to transfer than does mandatory enrollment. Other scholars reported similar effects of voluntary training programs for adults (Authoring Group Educational Reporting, 2018, p. 187; Baldwin, Magjuka, & Loher, 1991; Clark, Dobbins, & Ladd, 1993). In line with this, voluntary courses should yield the highest returns in terms of the development of civic skills because their participants are more interested and more inclined to learn than participants in mandatory courses. Furthermore, participants in mandatory courses might see the training as an additional burden. In addition, encouraging and active patterns of individuals may be the reason to voluntarily take part in further education courses and to participate in politics. Thus, it is important to distinguish between mandatory and voluntary training courses for adults. In sum, these theoretical considerations lead us to the following research questions and hypotheses:

- Research Question 1: To what extent do different types of non-formal and informal adult education affect adults' political participation?
- Research Question 2: To what extent do different types of non-formal and informal adult education compensate for the disadvantages of adults with low socioeconomic status?
- Hypothesis 1: Non-formal and informal adult education have an impact on adults' political engagement.
- Hypothesis 2: Non-formal and informal adult education have a larger impact on adults with a lower SES.
- Hypothesis 3: Voluntary non-formal training courses lead to higher political participation than mandatory, non-formal training courses.

3 Data and Methods

The analyses conducted are based on the starting cohort 6 (SC6, version 8.0.0) of the German National Educational Panel Study (NEPS: Blossfeld et al., 2011). This substudy provides longitudinal information on adult education and records a wide spectrum of formal, non-formal and informal educational activities as well as information on the previous life course of respondents. Data collection took place between 2009 and 2017.

For the purpose of this article, the dataset is reduced to adults who participated in waves 1 to 6 (2009 to 2013). On the one hand, this is necessary because respondents' participation in politics was collected only in wave 6 (2013). On the other hand, respondents' participation in non-formal and informal adult education was available between waves 1 to 6. Specifically, the dataset was reduced to those adults for whom valid information on their political participation was available. The dataset was further restricted to those for whom valid information on their participation in non-formal and informal learning activities was available between waves 1 to 6. These restrictions left a subsample of 9086[2] German residents born between 1944 and 1986. The respondents were, on average, 52.6 years old (SD = 0.11).

3.1 Political participation

In wave 6, respondents were asked about their participation in different political activities (coded as 0 = no, 1= yes). In addition, the dataset allows us to distinguish between the reported participation and the intention to participate (possible participation) in different political activities. In addition to voter turnout, the NEPS substudy collects data on respondents' participation in collections of signatures and authorized demonstrations. The different political actions collected in this substudy can be used to analyze the returns of formal, non-formal and informal learning activities on different dimensions of political participation. Considering different dimensions of political participation allows one to account for the different means citizens use to influence political decisions.

Respondents' participation differs with regard to different forms of political participation. 89% of respondents reported that they voted in the last German federal elections in 2013. Possible participation in the federal election was slightly higher: approximately 96% of respondents reported they would vote if German federal election were held tomorrow. Approximately 80% would participate in collecting signatures, while only 60% would take part in authorized demonstrations.

3.2 Non-formal and informal adult education

Between 2009 and 2013 (waves 1 to 6), information is available on various non-formal education opportunities. Therefore, for the analysis of this study, respondents' participation in non-formal and informal adult education will be calculated over a period of approximately 5 years. Non-formal courses can be further divided into voluntary and mandatory courses. We use this operationalization as an indicator of the motivation for course participation. In each survey wave, additional information such as funding, duration and motivation is available for the two course types. Therefore, between 2009 and 2013, up to ten courses can be distinguished in terms of this additional course information.

In addition to participation in training courses, between 2009 and 2013, information on respondents' participation in the following non-formal activities is available: visiting trade fairs, congresses, or special lectures. By calculating the respondents' participation in these activities, an additive index with a range from 0 to 5 was created. Measurements of informal education are available for the same period. We can differentiate between the following two variables: reading textbooks, specialized books or professional magazines, and using any computerized learning programs or learning from CDs or DVDs and similar materials. Again, an additive index was created to measure respondents' participation in these informal learning activities between 2009 and 2013. In sum, the following five non-formal and informal opportunities for adult education are available for the research purpose of this article: courses, congresses, special lectures, books/ magazines and computerized learning programs.

Information on adult participation in non-formal and informal education is as follows. The data show that approximately 69% of respondents participated in one or more non-formal courses over the last five years. Respondents attended, on average, two courses (M = 2.3; SD = 2.4) between 2009 and 2013. Furthermore, there is variation in adults' participation in adult learning with regard to the type of adult education. Respondents' average attendance in voluntary courses over the last five years (M = 1.6; SD = 2.0) was two times higher than in compulsory courses (M = 0.7; SD = 1.3). In addition, frequent attendance of adult training courses varies between compulsory and voluntary courses: while 20% of respondents attended more than one compulsory course, the percentage of those who participated in more than one voluntary course is higher (40%) (Table A1).

The distribution of other forms of non-formal and informal continuing education offers a very different picture (Table A2). Approximately 50% of respondents attended special lectures or used

computer-learning programs. Compared to other types of adult education, respondents' participation in congresses is lower. Reading books or magazines, on the other hand, at over 86%, seems more widespread. However, no information is available on the topics of these materials. Thus, it is not clear whether these books or magazines focus on knowledge relevant to becoming more competent in work/professional life, society and politics, or if they address more personal topics.

3.3 Socioeconomic status (SES)

An accurate measure of SES is educational attainment because it has the most consistent impact on political engagement (Brady et al., 1995; Nie, Junn, & Stehlik-Barry, 1996). We control the education lifespan in the form of general school qualification and VET. The combination of both school qualification and VET degree is implemented on the CASMIN scale[3]. When interacted with non-formal and informal adult education, educational attainment (measured via the CASMIN scale) permits a test of whether non-formal and informal adult education have, as hypothesized, a stronger impact on adults with lower SES.

3.4 Other control variables

In addition to the main explanatory factors, we also control the educational background of both parents via the CASMIN scale. Other control variables include gender, age, marital status, country of birth, state of residence (East or West Germany) and current employment.

4 RESULTS

4.1 Descriptive results of non-formal and informal adult learning and different modes of political participation

The following discussion describes the key findings from our analyses regarding the hypotheses proposed in this paper, based on the data in the NEPS Study (Starting Cohort Adults: SC6). Main bivariate findings will be presented first to shed more light on the main differences between the various forms of learning activities with regard to their correlation to other learning activities and different forms of political participation.

Table 1 presents the correlation between the different forms of non-formal and informal learning activities. The data in the NEPS Study reveal that there is a weak correlation between compulsory and voluntary courses. Thus, the initial impulse that leads adults to participate can be used to distinguish these two forms of non-formal courses. Moreover, there are crucial differences between these two forms regarding their correlation to other non-formal and informal learning activities. The correlation between voluntary courses and other non-formal courses such as congresses or special lectures is stronger than for mandatory courses. This might be because respondents' participation in congresses and special lectures is also voluntary. However, the NEPS Study provides no information as to whether participation in congresses or special lectures was voluntary. In a further step comparing the mean correlation of all activities, those who read specialized books or professional magazines participated significantly more often in other activities.

Table 1: Pearson correlation coefficients for non-formal and informal forms of adult education (N=9,084)

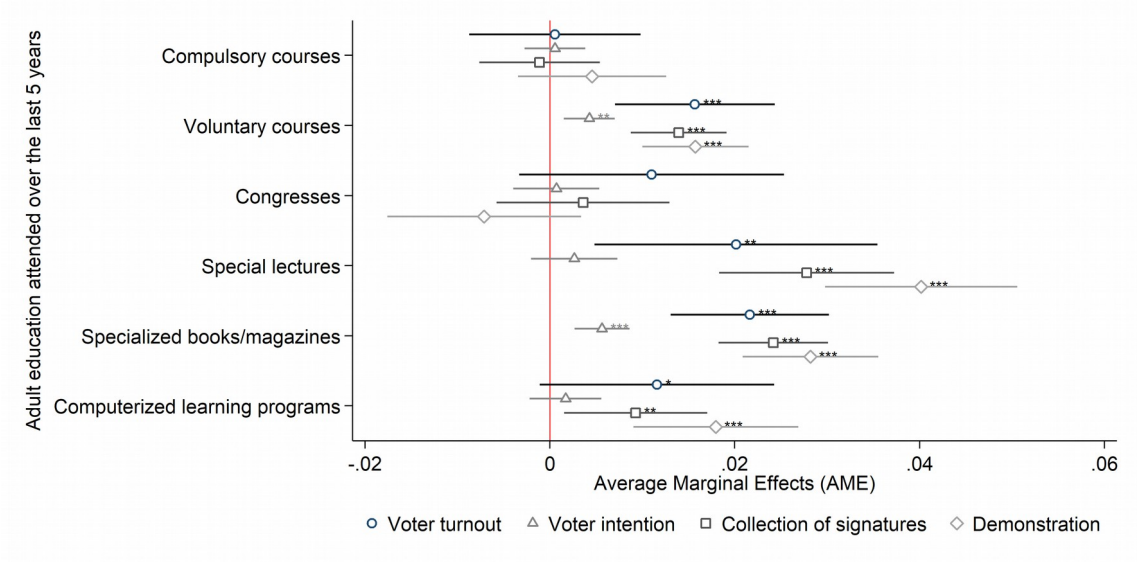
Measure	1	2	3	4	5	6
1. Compulsory Courses	–	.062***	.042***	.050***	.145***	.099***
2. Voluntary Courses		–	.226***	.320***	.372***	.178***
3. Congresses			–	.601***	.450***	.178***
4. Special lectures				–	.529***	.218***
5. Books or Magazines					–	.363***
6. Computerized learning programs						–

Note. *** p<0.001, ** p<0.01, * p<0.05. Source: LIfBi, NEPS, Starting Cohort Adults (SC6), Wave 1 to 6, doi:10.5157/NEPS:SC6:8.0.0. Unweighted sample, authors' calculations.

Figure 1 provides initial insights into the impact of respondents' participation in non-formal and informal adult education on their political participation. The aim here is to clarify the effect of non-formal and informal adult education on different modes of political participation when all non-formal and informal activities are controlled at the same time. Based on logistic regressions, the effect sizes of non-formal and informal adult education on adult voter turnout, voting intention, and intention to participate in collection of signatures and authorized demonstrations have been estimated. Because effect sizes such as the odds ratios are not comparable between models (Auspurg & Hinz, 2011), average marginal effects (AME) were estimated instead. The AMEs display the percentage-point change in the probability of the dependent variable for a one-unit change in the respective independent variable.

Political participation differed according to adult participation in non-formal and informal adult education. At first sight, the effect sizes may seem rather small. Figure 1 displays the percentage-point change in the probability of, for example, respondents' voter turnout for a one-unit change in the number of voluntary courses attended when respondents' participation in all other types of non-formal and informal adult education is controlled. Attending voluntary courses significantly affected adults' participation in all political activities, even when controlled for other non-formal and informal adult education. This is also the case for the number of books or magazines read between 2009 and 2013: an increase in the number of books or magazines read increased, for example, the likelihood to vote by 2.16%. Attending special lectures had no significant effect on respondents' voting intention but did affect their participation in the last federal elections in 2013 and their intention to participate in collections of signatures and in demonstrations. Using computerized learning programs only significantly affected respondents' intention to collect signatures or to take part in demonstrations. Attending compulsory courses or congresses did not significantly affect respondents' political participation. However, the logistic regressions conducted to create Figure 1 only included respondents' participation in non-formal and informal adult education. No other control variables were included in these models. Thus, the following analysis includes important control variables to see if the effects of non-formal and informal adult education reported in Figure 1 remain.

Figure 1: Adult participation in political activities by respondents' participation in non-formal and informal adult education (logistic regressions, average marginal effects AME, 95% CIs).



Note. Estimates based on estimation of models only including adolescent participation in non-formal and informal adult education. *** p<0.001, ** p<0.01, * p<0.05. Model fit: Voter turnout (N=3,118, Pseudo R^2 Nagelkerke=0.118), Voting intention (N=9,084, Pseudo R^2 Nagelkerke=0.031), Collection of signatures (N=9,067, Pseudo R^2 Nagelkerke=0.074), Authorized Demonstration (N=9,076, Pseudo R^2 Nagelkerke=0.067). Source: LIfBi, NEPS, Starting Cohort Adults (SC6), Wave 1 to 6, doi:10.5157/NEPS:SC6:8.0.0. Unweighted sample, authors' calculations.

The influence of adults' non-formal and informal education on different forms of political participation will be revealed with the aid of separate multivariate logistic regression models (Table 2 and Table 3, Models 1–4). The goal of the following regression models is to clarify the effect of non-formal and informal adult education on different modes of political participation when important control variables are taken into account. To compare these models, the same independent variables will be used in each regression model. Again, average marginal effects will be reported to make the effect sizes of the models comparable. To assess the model fit of each regression model, the Pseudo R-square by Nagelkerke will be used.

4.2 Reported voter turnout and voting intention

In Model 1, approximately 23% of the variance in the dependent variable (reported voter turnout in the 2013 German federal election) is explained by the independent variables (Table 2). Approximately 14% of the variance in the dependent variable (reported voter turnout) is explained by adults' formal, non-formal and informal education. Approximately 9% of the variance in the reported voter turnout is explained by adults' formal education when non-formal and informal learning activities are not included in the model (Table 4A). The lowest predictive power is shown in Model 2: only approximately 7% of the variance in the intention to vote is explained by the factors accounted for in the model. Although the regression models of the intention to vote and the reported voter turnout (Table 2, Model 2 vs. 1) show almost similar significant explanatory factors, the impact of the independent variables on reported voter turnout is stronger compared to Model 2.

According to Model 1, adults' reported voter turnout differed depending on formal education. However, the effect size of formal education decreased when adults' participation in non-formal

and informal learning activities was included in the model (Table A4). Reading books had an additional and substantial impact on adults' reported voter turnout: the more specialized books or professional magazines adults had read over the last five years, the higher their likelihood of voting. With each specialized book or professional magazine, the likelihood to vote increased by 1.1%. Those who had used computerized learning programs during the last 5 years were slightly more likely to take part in the German federal elections in 2013: an increase of one computerized learning program was related to a 1.3% higher probability of voting. In contrast, the effect of non-formal training courses, congresses and special lectures is not significant. The higher participation likelihood of adults who were reading books or using computerized learning programs can be partly explained by the fact that congresses and special lectures focus more on knowledge relevant in very specific contexts than on knowledge that is relevant for different contexts. Learning environments that enable the acquisition of broad knowledge may foster, in turn, the acquisition of those civic skills that are relevant for political participation. In terms of the control variables, the findings of Model 1 reveal that parental education did not affect adult voter turnout, whereas respondents' current employment, age, country of birth, marital status and residence did.

Table 2: Who has the intention to vote in federal elections and who voted in the German federal elections in 2013? (logistic regressions, average marginal effects AME)

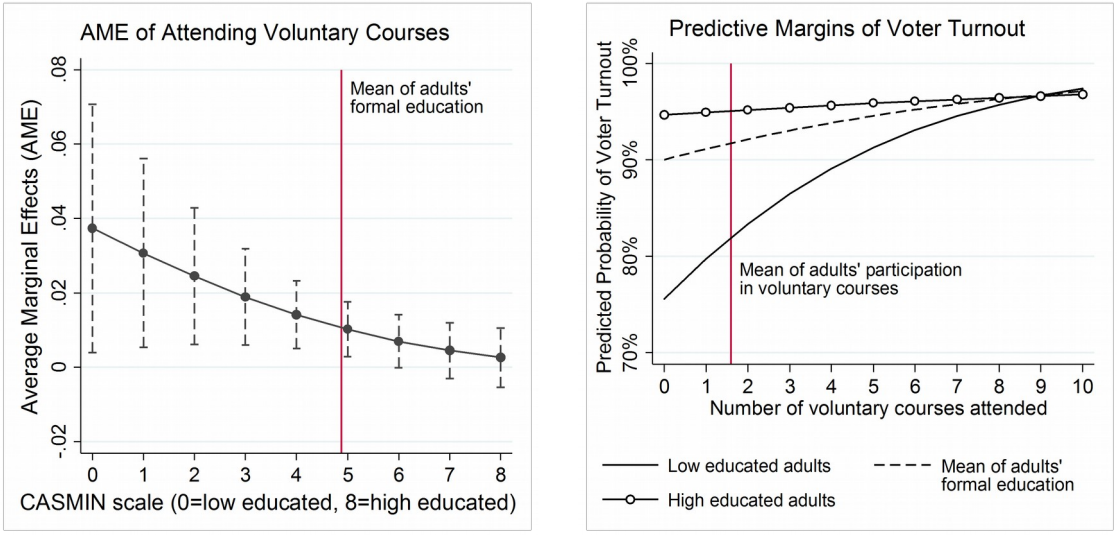
	Model 1: Reported voter turnout		**Model 2: Intention to vote**	
Sex (Ref.: male)	-0.005	(0.011)	0.003	(0.004)
Age	0.003***	(0.001)	0.001**	(0.000)
Current employment (Ref.: unemployed)	0.072***	(0.012)	0.013*	(0.005)
Residence (Ref.: West Germany)	-0.026	(0.014)	-0.021***	(0.006)
Country of birth (Ref.: Germany)	-0.195***	(0.029)	-0.023*	(0.010)
Marital status (Ref.: not married)	0.052***	(0.012)	0.017***	(0.005)
Casmin	0.017***	(0.003)	0.005***	(0.001)
Casmin mother	0.002	(0.004)	-0.000	(0.001)
Casmin father	0.005	(0.003)	0.004**	(0.001)
Adult education attended over the last 5 years				
Number of compulsory courses	-0.002	(0.005)	0.000	(0.002)
Number of voluntary courses	0.007	(0.004)	0.002	(0.001)
Number of congresses	0.006	(0.007)	0.001	(0.002)
Number of special lectures	0.008	(0.007)	-0.000	(0.002)
Number of books/magazines	0.011*	(0.004)	0.003*	(0.002)
Number of computerized learning programs	0.013*	(0.006)	0.002	(0.002)
N	3,118		9,084	
Pseudo R^2 (Nagelkerke)	0.231		0.067	

Note. Standard errors are in parentheses. *** p<0.001, ** p<0.01, * p<0.05. Source: LIfBi, NEPS, Starting Cohort Adults (SC6), Wave 1 to 6, doi:10.5157/NEPS:SC6:8.0.0. Unweighted sample, authors' calculations.

We also test whether the effect of respondents' non-formal and informal adult education on voter turnout varies across different levels of formal education. Interactions are often difficult to interpret from coefficients alone (Campbell, 2009, p. 780). To clarify the interpretation of the

interactions, the results are displayed in Figure 2. For easier interpretation, Figure 2 reports only the effect of attending voluntary courses, but the model includes all other non-formal and informal learning activities. The figure depicts the effect of respondents' participation in voluntary courses on voter turnout in the federal elections in 2013 for different levels of formal education. Note that Figure 2 accounts only for respondents' formal education and their participation in non-formal and informal education plus the corresponding interaction terms. No other control variables were included in these models.

Figure 2: Effects of respondents' participation in voluntary courses on voter turnout in the federal elections in 2013 at different levels of formal education (logistic regression, average marginal effects AME (95% CIs) and Predictive Margins PM).



Note. Estimates based on estimation of an additional model only including adults' formal education and their participation in non-formal and informal adult education. N=3,118. Pseudo R^2 (Nagelkerke)=0.146. Source: LIfBi, NEPS, Starting Cohort Adults (SC6), Wave 1 to 6, doi:10.5157/NEPS:SC6:8.0.0. Unweighted sample, authors' calculations.

The effect size of non-formal or informal adult education on voter turnout depends on the formal education achieved in the life course: the impact of the number of voluntary courses attended decreases with an increase in respondents' formal education. As seen in the left graph in Figure 2, the effect size of attending voluntary courses on voter turnout decreases substantially (from .037** to .002) as adults' formal education increases. For easier interpretation, the right graph in Figure 2 displays the predicted probability of voting according to respondents' participation in voluntary courses and their formal education. The predicted probability of voting for low educated adults who did not attend voluntary courses during the last five years is 75%. The probability of voting increases to 96% for low-educated adults reporting the maximum number of voluntary courses. The line for adults with the highest level of formal education is nearly flat (see the right graph in Figure 2). In other words, attending voluntary courses has no impact on adults with a high level of formal education. The figures for attending special lectures and reading books/magazines are very similar. In sum, voluntary courses, specialized books/professional magazines and special lectures have the greatest impact on adults with low formal education. However, the interactions did not reach statistical significance for the other forms of non-formal and informal adult education (mandatory courses, congresses or computerized learning programs). These findings and their implications for both the compensation hypotheses and future research will be discussed in the last section.

4.3 Possible participation in collections of signatures and authorized demonstrations

At first glance, adult education measures seem to play a more important role in Model 3 (intention to participate in collections of signatures) and Model 4 (intention to participate in authorized demonstrations) compared to Model 1 (reported voter turnout) and Model 2 (voter intention). However, the predictive power of Model 3 and Model 4 was low. Thus, control variables other than those accounted for in these models could reduce the impact of adult education measures.

The number of voluntary training courses attended during the last five years did affect adults' plans to participate in collections of signatures and demonstrations, whereas the number of mandatory courses did not. However, the effect sizes were small: those who participated in voluntary training courses planned to take part in collections of signatures and authorized demonstrations slightly more often. Models 3-4 show that the effect sizes of special lectures, books or magazines and computerized learning programs were small but significant. Interestingly, attending congresses has a small negative but significant effect on the intention to participate in demonstrations (Table 3). This result is surprising because in the bivariate analysis (Table A3), the effect of congresses on political participation was positive. This may be because of the interaction with the different types of formal education accounted for in the regression models. Formal education had a strong influence on adult intention to participate in collections of signatures and demonstrations.

Table 3: Who intends to participate in collections of signatures and authorized demonstrations? (logistic regressions, average marginal effects AME)

	Model 3: Collections of signatures		**Model 4: Authorized demonstrations**	
Sex (Ref.: male)	-0.018*	(0.008)	-0.061***	(0.010)
Age	0.001	(0.000)	0.001	(0.001)
Current employment (Ref.: unemployed)	0.003	(0.010)	0.017	(0.013)
Residence (Ref.: West Germany)	0.001	(0.010)	0.006	(0.012)
Country of birth (Ref.: Germany)	-0.129***	(0.019)	-0.041*	(0.021)
Marital status (Ref.: not married)	0.026**	(0.009)	-0.011	(0.011)
Casmin	0.022***	(0.002)	0.029***	(0.003)
Casmin mother	0.006*	(0.003)	-0.003	(0.003)
Casmin father	-0.001	(0.002)	0.006*	(0.003)
Adult education attended over the last 5 years				
Number of compulsory courses	-0.001	(0.003)	0.004	(0.004)
Number of voluntary courses	0.010***	(0.003)	0.013***	(0.003)
Number of congresses	0.001	(0.005)	-0.012*	(0.005)
Number of special lectures	0.019***	(0.005)	0.032***	(0.005)
Number of books/magazines	0.015***	(0.003)	0.017***	(0.004)
Number of computerized learning programs	0.009*	(0.004)	0.016***	(0.005)
N	9,065		9,067	
Pseudo R^2 (Nagelkerke)	0.108		0.093	

Note. Standard errors are in parentheses. *** p<0.001, ** p<0.01, * p<0.05Source: LIfBi, NEPS, Starting Cohort Adults (SC6), Wave 1 to 6, doi:10.5157/NEPS:SC6:8.0.0. Unweighted sample, authors' calculations.

In sum, after controlling for different and important explanatory factors, the regression models report small-to-moderate but significant effects for some types of non-formal and informal adult education. Additional estimations show that the inclusion of non-formal and informal adult education increases the Pseudo R-square (Nagelkerke) in Model 1 by 0.6% and in Model 2 by 2.5%. In Models 3 and 4, the inclusion of non-formal and informal adult education increased the Pseudo R-square (Nagelkerke) by 2.6%.

5 Discussion

This article investigated the link between non-formal and informal adult education and different forms of political participation. To reveal the contribution of non-formal and informal adult education to adults' participation in politics, important explanatory factors were controlled. The results support the widespread view that formal education has an impact on citizens' political participation. In contrast to other studies on political participation, this article accounted for formal education via the CASMIN scale and was thus able to control for different types and different educational chains of formal education. Furthermore, the findings show that non-formal and informal adult education has an additional and substantial impact on adults' political participation (Hypothesis 1). However, the effects of non-formal and informal adult education differ with regard to the different forms of political participation. Non-formal training courses and informal adult learning have a greater impact on adults' intention to participate in collections of signatures and authorized demonstrations than on adults' reported voter turnout.

Moreover, it is important to further distinguish between voluntary and mandatory courses. Mandatory courses did not affect adults' political participation, whereas voluntary courses did (Hypothesis 2). One explanation is perhaps that voluntary courses may feature better learning settings to foster civic skills that in turn trigger political participation. There might also be variations between participants in voluntary and mandatory courses. The motivation and particularly the interest in the subject of the course may be higher in voluntary courses. Findings from other studies show that participants in voluntary courses report a higher acquisition of new knowledge and skills than participants in mandatory courses (Authoring Group Educational Reporting, 2018, p. 187). Another way to explain these differing effects is that participants in mandatory courses might see the training as an additional burden and thus show less interest and motivation. However, one cannot dismiss that encouraging and active patterns of individuals may be the reason to voluntarily take part in further education courses and to participate in politics. In addition to voluntary courses, attending special lectures has an impact on adults' intention to take part in collections of signatures and participate in demonstrations. Compared to voluntary courses, congresses and special lectures, the effect of congresses is slightly smaller. Non-formal adult education has no significant effect on adult voter turnout in the last federal election or on the intention to vote. Reading books or magazines seems to be more important for the federal election.

Furthermore, the findings provide mixed evidence for the compensation hypothesis (Hypothesis 3). There is no evidence for compensation when applied to mandatory courses, congresses or computerized learning programs. Contrarily, the results support the compensation hypothesis, as it applies to voluntary courses, books/magazines and special lectures. In these cases, non-formal and informal adult education has a considerable impact on adults of low SES (measured by the CASMIN scale).

Moreover, the results underline the importance of a differentiated analysis of political participation and non-formal and informal adult education. It is necessary to distinguish between different forms of political participation. In addition, the results differ with regard to the intention to participate and reported participation. Studies indicate that the intention of political participation may be higher than reported participation (Steinbrecher, 2009). Thus, measures of

political participation via intention may be biased. The intention to do something does not take into account the cost and benefit of a political act. This study mainly focused on intention to participate politically because the NEPS Study only provided the reported participation for the last elections. To prove the robustness of the findings presented in this article, it is crucial to re-estimate the effects of non-formal and informal adult education on adults' reported participation in unconventional political activities such as collections of signatures and authorized demonstrations. Another weakness of this study is that respondents' intention to participate and reported participation were collected only once. The dataset does not provide information on respondents' initial political participation. Because this article has been limited to a cross-sectional dataset, it cannot account for self-selection processes. Therefore, a causal effect of non-formal and informal adult education is difficult to isolate due to confounding factors (i.e., variables possibly related to both adult education and engagement).

This paper underlines the importance of further research on the effects of non-formal and informal education, as ambiguity remains regarding the precise mechanism by which non-formal and informal adult education might influence adults' political participation. It is probable that some part of what is observed as the influence of non-formal and informal education works through a positional pathway. Adult education may improve adults' SES and thus place them in environments that encourage political participation. Similarly, there is likely also a cognitive pathway: adults who participate in non-formal and informal adult education develop civic skills, which in turn trigger political participation. Both pathways could occur at the same time. It should be emphasized that the pathways described in this article represent extreme opinions about the impact of education and that there are several (other) explanatory factors. Nevertheless, the models help to illuminate possible pathways between adult education and political participation.

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ENDNOTES

[1] In some federal states, comprehensive schools or schools with multiple tracks (Gesamtschule) were introduced as an alternative to the traditional three-tiered secondary education system.

[2] Because of item nonresponse, the sample size can vary with the political activity. Compared to the other dependent variables, there is only a small sample size available for actual voter turnout. This is because voter turnout in the 2013 German federal elections was collect for only 33% of respondents. The rest of the sample was asked about their participation in the 2009 federal elections. Since this article accounts for adult learning between 2009 and 2013, respondents' participation in the 2009 federal election cannot be investigated.

[3] According to the typical German educational trajectories, the scale includes the following characteristics: 0 = Inadequately completed general education, 1 = General elementary education, 2 = Basic vocational qualification or general elementary education and vocational qualification, 3 = Intermediate vocational qualification or intermediate general qualification and vocational qualification, 4 = Intermediate general qualification, 5 = Full maturity certificates, 6 = Vocational maturity certificate or General maturity certificate and vocational qualification, 7 = Lower tertiary education and 8 = Higher tertiary education.

APPENDIX

Table A1: Number and distribution of compulsory and voluntary courses

Number of courses	Type of non-formal training course				Overall	
	Compulsory		Voluntary			
	n	%	n	%	n	%
0	5,952	65.5	3,740	41.2	2,805	30.9
1	1,410	15.5	1,765	19.4	1,444	15.9
2	920	10.1	1,311	14.4	1,447	15.9
3	374	4.1	814	9.0	943	10.4
4	234	2.6	590	6.5	839	9.2
5	97	1.1	363	4.0	522	5.7
6	60	0.7	242	2.7	462	5.1
7	19	0.2	125	1.4	232	2.6
8	14	0.2	78	0.9	214	2.4
9	2	0.0	38	0.4	88	1.0
10	2	0.0	18	0.2	88	1.0
N	9,084	100.0	9,084	100.0	9,084	100.0
M	**0.7**		**1.6**		**2.3**	
SD	**1.3**		**2.0**		**2.4**	

Source: LIfBi, NEPS, Starting Cohort Adults (SC6), Wave 1 to 6, doi:10.5157/NEPS:SC6:8.0.0. Unweighted sample, own calculations.

Table A2: Number and distribution of non-formal and informal activities

Number of courses	Non-formal activities				Informal activities			
	Attend a congress		Attend a special lecture		Read books/magazines		Use computerized learning programs	
	n	%	n	%	n	%	n	%
0	5,354	58.9	4,675	51.5	1,262	13.9	4,634	51.0
1	1,622	17.9	1,814	20.0	1,196	13.2	2,067	22.8
2	1,020	11.2	1,167	12.8	1,310	14.4	1,227	13.5
3	612	6.7	816	9.0	1,947	21.4	692	7.6
4	311	3.4	392	4.3	1,340	14.8	330	3.6
5	165	1.8	220	2.4	2,029	22.3	134	1.5
N	9,084	100.0	9,084	100.0	9,084	100,0	9,084	100.0
M	**0.8**		**1.0**		**2.8**		**0.9**	
SD	**1.2**		**1.3**		**1.7**		**1.2**	

Source: LIfBi, NEPS, Starting Cohort Adults (SC6), Wave 1 to 6, doi:10.5157/NEPS:SC6:8.0.0. Unweighted sample, own calculations.

Table A3: Pearson correlation coefficients for non-formal and informal forms of adult education and different modes of political participation

Forms of non-formal and informal education	Forms of political participation			
	Voter turnout last election[1]	Intention to vote	Collections of signatures	Authorized demonstrations
Compulsory Courses	0.035	0.016	0.025*	0.039**
Voluntary Courses	0.144***	0.059***	0.127***	0.135***
Congresses	0.136***	0.045***	0.118***	0.112***
Special lectures	0.161***	0.056***	0.159***	0.175***
Books or Magazines	0.215***	0.082***	0.190***	0.190***
Computerized learning programs	0.114***	0.039**	0.094***	0.112***
N	3,118	9,084	9,067	9,067

[1] Compared to the other dependent variables, there is only a small sample size available for actual voter turnout. This is because voter turnout in the 2013 German federal elections was collect for only 33% of respondents. The rest of the sample was asked about their participation in the 2009 federal elections. Since this article accounts for adult learning between 2009 and 2013, respondents' participation in the 2009 federal election cannot be investigated.
Note. *p < 0.05; **p < 0.01; ***p < 0.001
Source: LlfBi, NEPS, Starting Cohort Adults (SC6), Wave 1 to 6, doi:10.5157/NEPS:SC6:8.0.0. Unweighted sample, authors' calculations.

Table A4: The impact of respondents' formal, non-formal and informal education on their reported voter turnout (logistic regressions, average marginal effects AME)

	(1) formal education	(2) + non-formal and informal education	(3) + control variables[1]
Casmin	0.031***	0.018***	0.017***
	(0.003)	(0.003)	(0.003)
Adult education attended over the last 5 years			
Number of compulsory courses		0.000	-0.002
		(0.005)	(0.005)
Number of voluntary courses		0.012**	0.007
		(0.004)	(0.004)
Number of congresses		0.012	0.006
		(0.007)	(0.007)
Number of special lectures		0.013	0.008
		(0.008)	(0.007)
Number of books/magazines		0.014**	0.011*
		(0.004)	(0.004)
Number of computerized learning programs		0.010	0.013*
		(0.006)	(0.006)
N	3.118	3.118	3.118
AIC	**2013.8**	**1939.4**	**1802.8**
BIC	**2025.9**	**1987.8**	**1899.5**
Pseudo R^2 (Nagelkerke)	**0.090**	**0.142**	**0.231**

[1] Control variables: sex, age, current employment, residence, country of birth, marital status, parental education.
Note. Standard errors are in parentheses. *** p<0.001, ** p<0.01, * p<0.05
Source: LIfBi, NEPS, Starting Cohort Adults (SC6), Wave 1 to 6, doi:10.5157/NEPS:SC6:8.0.0. Unweighted sample, authors' calculations.